Track Forecasting Exercise

2018 WMO RA-IV Workshop
March 7, 2018
Track Forecasting Exercise

- You are given 48-h model forecast tracks for a hurricane in the Bay of Campeche.

- You are also given 850 mb vorticity, 500mb height, and 200mb wind fields for the members of the multimodel consensus (GFS, ECMWF, UKMET, HWRF, GFDL)

- Using this information, make a 12-, 24-, 36-, and 48-h track forecast for the hurricane. Provide a latitude and longitude position (to the nearest tenth of a degree), and compute the storm motion at each forecast hour. Plot your forecast on the map provided.

- Will the hurricane make landfall in the next 48 hours? And if so, where?

- Is it time to issue a Hurricane Warning?
Track Forecast Worksheet

### National Hurricane Center Advisory Composition Worksheet

<table>
<thead>
<tr>
<th>Cyclone Name</th>
<th>ATCF ID</th>
<th>Adv #</th>
<th>Special</th>
<th>Last</th>
<th>Date</th>
<th>Time (UTC)</th>
<th>Forecaster(s)</th>
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<tbody>
<tr>
<td>Hurricane WMO</td>
<td>ALX3.2014</td>
<td>XX</td>
<td>□</td>
<td>□</td>
<td>7 March 2014</td>
<td>1800</td>
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### Watches and Warnings
- Hurricane Warning: North of Cuba into the Carribean

### Hazards Statements
- Storm Surge
- Rainfall
- None

### Notes

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### Predicted Data

<table>
<thead>
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<th>Post</th>
<th>Date/Time (UTC)</th>
<th>Lat (N0)</th>
<th>Lon (W0)</th>
<th>Dir/Spd (deg/kts)</th>
<th>Pres (mb)</th>
<th>Wind (kt)</th>
<th>Conc (kt)</th>
<th>Status</th>
<th>Wind Radius (mi)</th>
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Will the storm make landfall within 48 hours? (Yes or No) ________

If yes, what is your forecasted landfall position? (Lat/Lon) ________

If the storm is forecasted to remain the same intensity and size, is it time to issue a Hurricane Warning? (Yes or No) ________
Part 1: Compute the initial Storm Motion
How to compute the storm motion

Unit Conversions:
1 kt = 1 n mi / h
1° latitude = 60 n mi
1/60° latitude = 1 n mi

\[
\text{Speed (kt)} = \frac{\text{distance (degrees)}}{\text{time (h)}} \times \frac{60 \text{ (n mi)}}{1 \text{ (degree)}}
\]

\[
\text{Direction} = \text{Clockwise degrees departure from 0° (N)}
\]
Calculating the Initial Motion

Direction = 15°

Motion Vector = 015/08

Speed = \frac{0.8 \text{ (degrees)}}{6 \text{ (h)}} \times \frac{60 \text{ (n mi)}}{1 \text{ (degree)}} = 8 \text{ kt}
<table>
<thead>
<tr>
<th>Fcst Hr</th>
<th>Date/Time (UTC)</th>
<th>Lat (°N)</th>
<th>Lon (°W)</th>
<th>Dir/Spd (deg/kt)</th>
<th>Pres (mb)</th>
<th>Wind (kt)</th>
<th>Gusts (kt)</th>
<th>Status</th>
<th>Wind Radii (nm)</th>
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</table>
Part 2: Make a Forecast
Initial position, storm motion, and previous forecast

Position:
- 21.0 N
- 94.4 W

Motion:
- 015° (NNE)
- 8 kt

Intensity:
- 65 kt

Previous Forecast:

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<th>Lat</th>
<th>Lon</th>
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<tbody>
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<tr>
<td>48</td>
<td>22.5</td>
<td>97.3</td>
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</table>
Initial model fields

00-h forecasts of:
- 850mb relative vorticity (shaded, x10^-5/s),
- 500mb geopotential height (black contours, x10m)
- 200mb wind vectors (blue barbs, kt)
12-h Model Forecast Fields

12-h forecasts of:
- 850mb relative vorticity (shaded, $\times 10^{-5}/s$),
- 500mb geopotential height (black contours, $\times 10^m$),
- 200mb wind vectors (blue barbs, kt)
12-h Model Forecast Tracks

Note: BAMD and TVCN are in the same location
Track Forecast Map
### Track Forecast Worksheet

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</tbody>
</table>
24-h forecasts of:
- 850mb relative vorticity (shaded, x10^-5/s),
- 500mb geopotential height (black contours, x10m)
- 200mb wind vectors (blue barbs, kt)
36-h forecasts of:
- 850mb relative vorticity (shaded, x10^-5/s),
- 500mb geopotential height (black contours, x10m)
- 200mb wind vectors (blue barbs, kt)
36-h Model Forecast Tracks
48-h forecasts of:
- 850mb relative vorticity (shaded, $x10^{-5}/s$),
- 500mb geopotential height (black contours, x10m)
- 200mb wind vectors (blue barbs, kt)
Part 3: Answer Questions
• Hurricane Watch: hurricane conditions are \textit{possible} somewhere within the watch area. Because hurricane preparedness activities become difficult once winds reach tropical storm force, the hurricane watch is issued \textbf{48 hours} in advance of the anticipated onset of tropical-storm-force winds.

• Hurricane Warning: hurricane conditions are \textit{expected} somewhere within the warning area. Because hurricane preparedness activities become difficult once winds reach tropical storm force, the hurricane warning is issued \textbf{36 hours} in advance of the anticipated onset of tropical-storm-force winds.
Will the storm make landfall within 48 hours? (Yes or No) _______

If yes, what is your forecasted landfall position? (Lat/Lon) _________

If the storm is forecasted to remain the same intensity and size, is it time to issue a Hurricane Warning? (Yes or No) _________